WORKERS COMPENSATION CASES WITH TRAUMATIC BRAIN INJURY: AN INSURANCE CARRIER’S ANALYSIS OF CARE, COSTS, AND OUTCOMES

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Abstract
The purpose of this survey was to review the medical care, medical costs, and outcomes of 86 Workers Compensation cases involving traumatic brain injury. An analysis of ICD-9 diagnoses, Rancho Los Amigos Cognitive Levels, age, sex, accident description, management techniques, costs, outcomes, and many other factors was conducted. The total indemnity (wage loss) and medical payments amounted to $27.1 million. For example, one case with temporal lobe hematomata, due to a fall in 1972, has had $1.1 million in medical payments since the injury occurred. The current average age is 40 years with 71% still residing at home. Only 10% are currently employed and 40% are known to be receiving other benefits. The increasing frequency and severity of these cases, as well as the extension of survival due to improved care and technology, highlight the need to address the question, “Who will be the caretakers, and what will be the associated costs?” Actuarial projections into the 21st century are given. It is concluded that, while further long-term studies are needed, Workers Compensation carrier representatives and health care providers must continue to work together on the interdisciplinary rehabilitation team.

Key Words: traumatic brain injury; workers compensation; insurance

Methods
Since December 1982, traumatic brain injury files have been followed by the Commercial Insurance Division’s Claim Department on a computer program known as TAG (TRACK ANY GROUP-CODE 050). Periodic reviews of individual outstanding (open) files were conducted prior to that date. Ninety-four spinal cord injury cases were studied in October 1988, which provided important data on cost projections.1 However, there had never been a review of the majority of Workers Compensation cases involving traumatic brain injury. The primary purpose of the study, which was completed in December 1989, was to review the medical care, medical and indemnity costs, and outcomes of 86 Workers Compensation cases. This number does not represent all the traumatic brain injury cases handled in the Commercial Insurance Division. The frequency and monetary computations are representative of only those claims in the survey, and, thus, we would caution against using these values as a strategy to set reserves.

An interoffice communication and a traumatic brain injury survey form (Exhibit A) were sent to Field Office Claim Managers. The response forms were analyzed in conjunction with the Home Office claim file and any other background information contained in separate folders in the AELIRT system. AELIRT tracking of catastrophic injuries, including traumatic brain injury cases, was inaugurated in 1985. The data elements collected from the survey form were evaluated by Medical, Claim, and Actuarial staffs. A post-survey questionnaire follow-up form (Exhibit B) was used when needed. Seven cases are described in limited detail for illustrative purposes (Table 4).

Results
Diagnoses, Age, and Costs
By comparison with spinal cord injury, the classification of traumatic brain injury is complex. All cases were given an International Classification of Diseases (ICD-9) code after a review of any medical reports on the file.2 The 47 (55%) who sustained skull fractures (ICD-9 800-804 series) averaged 35 years of age at the date of injury or 39 years at the date of the survey. The medical reserve** was $20 million, with $10 million having already been paid. Thirty-five (41%) incurred intracranial injury, excluding skull fracture (ICD-9 850-854 series). They averaged 37 years of age at the date of injury and 42 years at the date of the survey, compared with the average age of the claimants in the entire

* The acronym for Aetna’s Large Injury Rehabilitation Team is described in the brochure: AELIRT-Medical Management Procedures, Field and Home Office (AA-7195) 1-90, CAT. 83081A.
** The reserve is defined as an amount which represents the probable cost of what will be paid. It includes those payments already made, as well as estimated future payments. The medical reserve is an estimate of the lifetime cost of care. The indemnity reserve represents the wage loss replacement anticipated which is paid according to Workers Compensation statutory requirements.
study, namely, 36 years at the date of injury and 40 years at the date of the survey. The medical reserve for those with intracranial injury, excluding skull fracture, was $17 million, with $8 million paid.

Although not the major focus of the study, a miscellaneous category was established because of residual brain injury, due to:

- carotid cavernous sinus fistula and post-traumatic aneurysm of the internal carotid artery (ICD-9 854.14 and 900.03)
- heat stroke and anoxic brain damage (ICD-9 992.0 and 348.1)
- electrocution and anoxic brain damage (ICD-9 994.8 and 348.1)—two cases.

The intent of the miscellaneous category was to portray a sample of this type of significant brain injury. These four (5%) claimants averaged 29 years of age at the date of loss, and 30 years at the time of the survey. Of importance is the fact that the medical reserve was $3 million, with $1 million having been paid. Although there are many files of a similar nature, this study emphasized the ICD-9 800-854 series of diagnoses for consistency, that is, those who had known direct trauma to the skull or its contents.

Table 1 contains data sorted by ICD-9 group and figure 1 graphically depicts the average medical paid and average medical reserve by group. The average reserve for the miscellaneous category is notably higher than the other two groups though the average paid is relatively the same. It was somewhat surprising to find that the data did not show significant cost differences whether there was or was not a skull fracture involved.

The indemnity dollars were not specifically analyzed other than for obtaining the overall total.

The total reserve (medical and indemnity) for all cases exceeded $64 million, which included combined medical and indemnity paid of over $27 million. It is realized that there may be other classifications or categories being used in traumatic brain injury research throughout the country, but we used the accumulated medical information provided in the claim files. As a practical matter, classification by duration of post-traumatic amnesia could not be accomplished.

In computing the life expectancy of a traumatic brain-injured individual, the Claim Medical staff uses mortality tables which consider duration of unconsciousness and time since last epileptic seizure. An evaluation of claims surveyed, based on these criteria was, therefore, performed (Table 2). When the group was sorted by duration of unconsciousness, 40 (47%) were unconscious from 2 to 40 days and had, as would be expected, the highest medical reserve ($15 million), and the
highest medical paid ($8 million). Twelve (14%) claimants were unconscious over 40 days, demonstrating a medical reserve of $10 million and medical paid of $4 million. These represent the highest average costs. Those with recorded duration of unconsciousness (two days or less) totaled 21 (24%). Unfortunately, 13 (15%) were unknown. The age of the individual does not appear to have a bearing upon the duration of unconsciousness.

Table 2
Duration of Unconsciousness and Last Epileptic Seizure
Time Since Last Epileptic Seizure

<table>
<thead>
<tr>
<th>Duration of Unconsciousness:</th>
<th>Over 4 yrs</th>
<th>Less 3 yrs</th>
<th>then Seizure</th>
<th>No Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>n-2 (2%)</td>
<td>n-7 (8%)</td>
<td>n-4 (5%)</td>
<td>n-13 (15%)</td>
</tr>
<tr>
<td>Total Medical Paid</td>
<td>1,287,157</td>
<td>1,889,843</td>
<td>1,038,222</td>
<td>$4,225,222</td>
</tr>
<tr>
<td>Total Medical Reserve</td>
<td>1,335,000</td>
<td>5,123,194</td>
<td>2,260,000</td>
<td>$8,718,194</td>
</tr>
<tr>
<td>Average Age at Injury</td>
<td>51</td>
<td>32</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Less than 2 days</td>
<td>n-2 (2%)</td>
<td>n-5 (6%)</td>
<td>n-14 (16%)</td>
<td>n-21 (24%)</td>
</tr>
<tr>
<td>Total Medical Paid</td>
<td>215,448</td>
<td>883,897</td>
<td>2,010,736</td>
<td>$3,110,081</td>
</tr>
<tr>
<td>Total Medical Reserve</td>
<td>315,000</td>
<td>1,340,000</td>
<td>4,417,029</td>
<td>$6,072,029</td>
</tr>
<tr>
<td>Average Age at Injury</td>
<td>25</td>
<td>38</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>2 - 40 days</td>
<td>n-4 (5%)</td>
<td>n-10 (12%)</td>
<td>n-26 (30%)</td>
<td>n-40 (47%)</td>
</tr>
<tr>
<td>Total Medical Paid</td>
<td>974,907</td>
<td>2,193,163</td>
<td>4,344,656</td>
<td>$7,512,726</td>
</tr>
<tr>
<td>Total Medical Reserve</td>
<td>1,873,951</td>
<td>4,227,274</td>
<td>8,981,906</td>
<td>$15,083,131</td>
</tr>
<tr>
<td>Average Age at Injury</td>
<td>44</td>
<td>32</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Over 40 Days</td>
<td>n-0 (0%)</td>
<td>n-4 (5%)</td>
<td>n-8 (9%)</td>
<td>n-12 (14%)</td>
</tr>
<tr>
<td>Total Medical Paid</td>
<td>0</td>
<td>1,294,114</td>
<td>2,839,777</td>
<td>$4,133,891</td>
</tr>
<tr>
<td>Total Medical Reserve</td>
<td>0</td>
<td>2,600,000</td>
<td>7,033,824</td>
<td>$9,633,824</td>
</tr>
<tr>
<td>Average Age at Injury</td>
<td>0</td>
<td>46</td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>n-8 (9%)</td>
<td>n-26 (30%)</td>
<td>n-52 (60%)</td>
<td>n-86 (100%)</td>
</tr>
<tr>
<td>Total Medical Paid</td>
<td>$2,477,512</td>
<td>$6,271,017</td>
<td>$10,233,391</td>
<td>$18,981,920</td>
</tr>
<tr>
<td>Total Medical Reserve</td>
<td>$3,523,951</td>
<td>$13,290,468</td>
<td>$22,692,759</td>
<td>$39,507,178</td>
</tr>
<tr>
<td>Average Age at Injury</td>
<td>41</td>
<td>35</td>
<td>35</td>
<td>36</td>
</tr>
</tbody>
</table>

Another medical complication pertains to epilepsy. This condition relates not only to the cost of management, but also to the clinical outcome. Fifty-two (60%) cases have had no report of epilepsy. This compares with 26 (30%) who have had seizures within three years of the conclusion of the study; eight (9%) have had their last seizure four or more years ago. The majority of cases had no epilepsy, but the claimants were unconscious for 2-40 days.

Other Factors Influencing Outcome

The effect of other injuries incurred at the time of the accident was not analyzed. One must assume that concurrent fractures, for example, of the long bones, would add to the total cost and the final medical outcome or impairment.

In one case, a shoulder dislocation sustained at the time of injury was diagnosed one and one-half years post injury and required surgical repair. This incurred an additional hospitalization and follow-up costs (Case 7).

In another case, a significant knee injury may require a joint replacement arthroplasty in the future.

The health issues of aging and its inherent degenerative disease processes will add to the total cost projections in many of the cases, as will pre-existing illnesses and social habits, e.g., Diabetes Mellitus, Huntington's Disease, alcoholism, and drug abuse.

Seven (8%) claimants reported loss of or deficits in hearing and vision (Case 5) which may have effects on the individual's quality of life, as well as expenses for various functional aids or surgery.

The study revealed that although 49 (57%) of the claimants are functional and independent, 19 (22%) are helpless and dependent, and 18 (21%) are functional and dependent. In the latter situation, it is most likely that the claimants cannot be left alone because of cognitive, judgmental, behavioral, or physical restrictions.

When place of residence was examined, 61 (71%) of the claim-
ants were found to be at home, compared with 6 (7%) who were in nursing homes, and 6 (7%) in rehabilitation facilities. Nursing or attendant care proved to be necessary with 30 (49%) of those at home. The potential role for respite care is a strong consideration since 23 families are involved with this group of 30 claimants who are at home (Case 3). In approximately nine family settings, the advanced age or health of the caregiver could influence or complicate the case management and outcome.

**Accident Description**

A review of the accident cause codes and age groups revealed that the primary cause of injury related to a fall or a slip in 35 (41%) of the cases (fig 2). Their ages ranged from 15 to 70 years of age at the time of injury.

**Figure 2**

Causes of Traumatic Brain Injury

Of this group, six were due to falls from or related to utilization of a scaffold (Case 4). Twenty-four (28%) claimants ranging in age from 21 to 35 years were struck by a tool or an object. Nine (10%) claimants were in miscellaneous categories.

The most expensive cases on the average were found in the 16 (19%) cases where a motor vehicle accident was involved. They could be located in all age groups. Gunshot wounds were sustained in two (2%) cases where the claimants were younger on the average (21-22 years of age) than any other accident description cause. Five (6%) of the 86 cases were women; four had motor vehicle accidents, and one received a gunshot wound.

**Survival Time**

Fifty-four (63%) cases are three years or less from the date of the accident, whereas 32 (37%) range from 4 to 32 years since injury. The earliest date of accident was 1956 when the claimant was 29 years old (Case 1).

Thus, a follow-up of 32 years provides the longest known review. In this case, $347,358 has been paid for medical costs. The youngest claimant at the time of injury was almost 16 years old. He is now 60 and has had $1.1 million paid to date (Case 2). There were five claimants who were over age 60 at the date of the injury. The oldest claimant is 73. He was 67 years old when he fell from a ladder causing a closed head injury with a parietal contusion. In addition, there are four claimants who had turned age 60 by the time of the survey. Thus, there are a total of eight claimants who are at least age 60.

One 60-year-old claimant who was in coma since his motor vehicle accident in 1986 expired during the review process. The diagnosis was depressed temporoparietal skull fracture with subdural hematoma. Two other deaths occurred in individuals ages 45 and 46. Under such circumstances, the uncertainty of the medical cost exposure is eliminated, but there is the potential of continuing obligation by the insured or the employer to provide survivors' benefits (wage loss replacement).

**Cognitive Level**

A somewhat arbitrary position was taken to classify, at present, each claimant by Rancho Los Amigos cognitive level rather than other recognized disability scales or outcome classification systems. It is most widely used in Claim School training sessions for Claim Representatives and other in-house educational programs. Forty-six (54%) cases were considered to be at Level 7 or 8. The total medical paid for this group was $7 million. Twenty-six (30%) cases were placed in Levels 5 or
6 with $8 million having been paid. The remaining 14 (16%) consisted of cases which were classified as Cognitive Levels 1-4 and had $4 million medical paid. This latter group averaged five years post injury. Case 6 illustrates the complexity of medical management and the associated long-term costs. As would be expected, the average medical cost of a Level 7 or 8 is dramatically less than that of other levels (fig 3).

![Figure 3](image_url)

**Figure 3**

Average Medical Costs by Cognitive Level Groups

One must recognize that there is a lack of maturity of these outstanding claim files, and that there is the potential that those under three years post injury may continue to improve, with resultant decrease in costs and medical reserves. However, some may be affected by medical and nonmedical conditions which may necessitate increased medical reserve levels and medical cost considerations.

**Wage Replacement and Medical Costs**

At about the time of the initiation of the survey in early 1989, indemnity (wage replacement) reserves totalled $17 million (average $198,000). Medical reserves were $40 million (average $457,000). At the conclusion, one year later, the indemnity reserves totalled $20 million (average $231,000) while medical reserves increased to $45 million (average $524,000). Since such a large proportion (63%) of the cases are three years or less since time of injury, the long-term residuals of traumatic brain injury are not clearly demonstrable. The medical reserve is very uncertain, being influenced by the ability of those living at home with care or supervision provided by family members to remain in those settings. Obvious variables are the age and health of the caretakers in addition to the ability of the injured person to function safely in the community, e.g., not pose a threat to the safety of him/herself or others. We would advocate that traumatic brain injury claims be closely reviewed twice a year after the rehabilitation phase and community re-entry have been accomplished.

**Return to Work**

Only nine (10%) of the claimants are employed. Three of the nine who are working have returned to competitive employment, while the remainder of the employed group are involved in supported employment or sheltered workshops. Six (67%) of the employed group completed two rehabilitation programs and have had their cases involved in litigation. Those who are working have been doing so for more than one year. The authors feel that this is significant because the study did not attempt to capture data relative to the number of claimants who attempted vocational re-entry but did not succeed. Barriers to vocational re-entry are predominantly cognitive and physical in nature. Although it was thought that the perceived loss of wage replacement and social security benefits presented a major obstacle to return to work, the study failed to prove this.

From the medical point of view, one claimant who returned to competitive employment (Table 3) had an open posterior basilar skull fracture with subarachnoid hemorrhage associated with coma of 20 days duration (ICD-9 800.74); another had a bifrontal skull fracture with epidural hematoma (ICD-9 800.14) and was in coma four days; a third had closed head injury with left frontal contusion (ICD-9 851.02) associated with coma for approximately one day. None of the three have had seizures. All are currently considered Cognitive Level 7 or 8. Two are working for their original employers. An Aetna Field Office Nurse Consultant or private rehabilitation vendor was involved with each claimant. The medical reserve and the medical paid proved to be well below the average of all claims.

**Table 3**

Return to Work in Competitive Employment (n=3)

<table>
<thead>
<tr>
<th>Accident Cause</th>
<th>ICD-9</th>
<th>Age at Injury</th>
<th>Age at Survey</th>
<th>Medical Reserve</th>
<th>Medical Paid</th>
<th>Duration of Unconsciousness</th>
<th>Cognitive Level</th>
<th>Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Vehicle Accident</td>
<td>800.74</td>
<td>47</td>
<td>50</td>
<td>$180,000</td>
<td>$167,227</td>
<td>20 days</td>
<td>8</td>
<td>none</td>
</tr>
<tr>
<td>Fall or Slip</td>
<td>800.14</td>
<td>24</td>
<td>25</td>
<td>$37,000</td>
<td>$34,454</td>
<td>4 days</td>
<td>8</td>
<td>none</td>
</tr>
<tr>
<td>Motor Vehicle Accident</td>
<td>851.02</td>
<td>27</td>
<td>28</td>
<td>$130,000</td>
<td>$121,355</td>
<td>1 day</td>
<td>7</td>
<td>none</td>
</tr>
<tr>
<td>Average of 86 Cases:</td>
<td></td>
<td>36</td>
<td>40</td>
<td>$459,386</td>
<td>$220,720</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

Projections into the 21st Century

A previous study of spinal cord-injured claimants reported the authors' concerns relative to the impact of the number of injured individuals, the costs connected with their care in 1987, and projections for the year 2017. Figure 4 shows the 86 traumatic brain injury cases which arose in specific age groups at the date of injury, as well as their distribution in the time between the date of injury and the date of the survey. These cases total $40 million in medical reserves (Table 1). For an element of consistency, with the spinal cord injury analysis, the year 2017 was again selected for actuarial projections (fig 5).

Figure 4
Frequency Distribution of TBI Cases by Age at Injury & by Time Elapsed Since Injury
1989

Figure 5
Frequency Distribution of TBI Cases by Age at Injury & by Time Elapsed Since Injury
2017
There will be a greater number in all age groups and, also, an extended frequency distribution post injury. The dollar value (medical reserve) in 2017 is estimated to be $89 billion, using an inflation rate of 8.5%. The assumption is that there will be about 364 cases that year due to annual arisings of 15 new cases with closings of 3.5 cases. The increasing frequency and severity of these cases, as well as the extension of survival, due to improved care and technology, highlight the need to address the question, "Who will be the caretakers, and what will be the associated costs?"

From the insurance carrier's perspective, the handling of traumatic brain injury cases alone will be a major management issue, but, when combined with another catastrophic injury, such as spinal cord, there is an even greater sense of the importance of planning, interdisciplinary team staffing, and sound fiscal management.

**Case Reports**

Seven cases are described. Statistical information is summarized in Table 4. This information exemplifies that traumatic brain injuries occur under many varied circumstances, to people of all ages, with diversified outcomes from both a diagnostic and a cost basis.

### Table 4

**Summary of Seven Illustrative Cases**

<table>
<thead>
<tr>
<th>Case</th>
<th>Accident Cause</th>
<th>ICD-9</th>
<th>Age at Injury</th>
<th>Age at Survey</th>
<th>Medical Reserve</th>
<th>Medical Paid</th>
<th>Duration of Unconsciousness</th>
<th>Cognitive Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Struck by object</td>
<td>800.10</td>
<td>29</td>
<td>61</td>
<td>$ 500,000</td>
<td>$ 347,358</td>
<td>Unknown</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Fall</td>
<td>852.24</td>
<td>16</td>
<td>32</td>
<td>3,019,588</td>
<td>1,105,436</td>
<td>Unknown</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Motor Vehicle Accident</td>
<td>801.30</td>
<td>38</td>
<td>56</td>
<td>623,606</td>
<td>310,559</td>
<td>Unknown</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Fall</td>
<td>851.04</td>
<td>59</td>
<td>61</td>
<td>175,000</td>
<td>90,871</td>
<td>7 days</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Fall</td>
<td>852.04</td>
<td>23</td>
<td>26</td>
<td>750,000</td>
<td>503,291</td>
<td>21 days</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Fall</td>
<td>851.05</td>
<td>35</td>
<td>37</td>
<td>1,000,000</td>
<td>399,289</td>
<td>120 days</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Motor Vehicle Accident</td>
<td>852.24</td>
<td>48</td>
<td>51</td>
<td>457,970</td>
<td>282,729</td>
<td>18 days</td>
<td>8</td>
</tr>
</tbody>
</table>

Total of 7 Cases* $6,526,164 $3,039,533

* These seven cases are only 8% of the total number of cases but they account for 16% of the total medical payments.

**Case 1**

In 1956, at age 29, with an eight-month work history as a mechanic, the claimant was injured when a tire he was inflating blew off its rim and struck his head. His injuries included a five-inch open depressed skull fracture, severe brain laceration, and a contracoup injury. The duration of unconsciousness was unknown. There was resultant spastic triplegia, causing the claimant to lose the use of both legs and one arm. Active rehabilitation emphasized strengthening the extremities. Initial attempts at vocational training were unsuccessful, due to lack of motivation and emotional outbursts. Seizure activity was a problem for three years post injury. He continues to be controlled on medication.

Physical care has been exclusively accomplished by his wife. She has been paid a weekly wage for eight hours of care per day with periodic increases over the years. After 1967, the claimant was followed at a Veteran's Administration Hospital. His manual wheelchair was replaced by an electric wheelchair because of increasing wrist joint rigidity. Other improvements included the addition of a room in his home and the purchase of equipment, such as a Hoyer Lift, air conditioning, and a modified van.

The claimant became active with the issue of advocacy for the handicapped, resulting in an appointment by the Governor to chair a related committee. The principal caregiver, his wife, has had medical problems of hypertension and back pain. There is definite concern by the carrier's staff over the status of future care alternatives as further aging occurs.

The claimant had a total of $347,358 in medical payments. Since the survey was completed, he incurred an additional $21,000 in medical expenses, because of the loss of bowel and urinary bladder control. This has been causally related to the 1956 injury by an Independent Medical Examiner. He remains at Rancho Los Amigos Cognitive Level 8.

**Case 2**

At the time of the injury in June 1972, the claimant was a student (15½ years) who suffered a traumatic brain injury as the result of a fall through a skylight while working on a roof with his father's construction company. His injuries included an intracerebral hematoma of the left temporal lobe. He underwent two craniotomies, one for removal of the tip of the temporal lobe and hematoma, and a second one for the evacuation of a left frontal hematoma. He received initial rehabilitation at a rehabilitation hospital following acute hospital
care. In March 1973, he started a special education program for 1½ hours per day while at home. The claimant demonstrated poor impulse control and apathetic attitude.

He participated in a behavioral and language program, but, on return home, he was shown to have continued poor impulse control, compulsive eating, and poor concentration. In January 1975, he entered a psychiatric institution and was transferred to a second psychiatric facility in March 1976, where he remained for 10 years. He transferred to a brain injury rehabilitation facility for another 1½ years. There were many behavioral difficulties, such as lack of compliance with medical protocols, resulting in hospitalizations for dehydration and seizures. He had exacerbations of impulsive rebellious behavior and obesity.

In February 1987, he moved to a small group home in a farm setting. This experience has proven successful to date. He is calmer and uses medication to control petit mal seizures. He has adapted to the home setting, has assumed responsibilities, and has an acceptable social behavior.

The medical paid between 1972 and 1989 totalled $1,110,079. His present living expenses average $45,000 per year. This case demonstrates the frustrations in locating the appropriate facility for the traumatically brain-injured when home care is not a viable option. In 1972, there were very few rehabilitation beds identified for management of the traumatically brain-injured. The choices for care were either home, nursing home, or a psychiatric facility if there was an aggressive, impulsive behavior. He has been classified as Rancho Los Amigos Cognitive Level 7-8.

It is important to observe that even after 10 years with no specific program of traumatic brain injury rehabilitation, a definite potential for improvement still existed.

Case 3

A 38-year-old claimant was treated for depression and headaches for 18 months before it was recognized that his symptoms were related to a brain injury sustained in 1970. His initial injuries were basal skull fracture and extensive facial bone fractures. He was ultimately treated with electroshock treatments for depression and cingulotomy for excruciating headaches. Organic brain syndrome has been diagnosed. Following discharge from the acute care hospital, he was sent to a nursing home.

Persistent headaches, seizures (grand mal within three years), sleep apnea, and hypertension are ongoing problems. He has been categorized as Rancho Los Amigos Cognitive Level 8. His care was primarily guided by the psychiatrist who initially handled his depression. In exchange for an agreed upon stipend, family members have cared for the claimant on a rotating basis in their homes.

He is independent in the activities of daily living (ADL), but needs monitoring for personal hygiene, medication compliance, and meal preparation. Medical payments to date exceed $315,000. Actuarial tables project a 14-year life expectancy.

Case 4

A 59-year-old carpenter fell 25 feet from a scaffold at work in 1987. He sustained an intracerebral contusion with hemorrhage of the frontal lobe and was semi-comatose for seven days. He also had a fracture of the left humerus, injury to the left brachial plexus, and a ruptured spleen.

Two and one-half months post injury, he was discharged to a rehabilitation program for one month. Follow-up care consisted of physical therapy three times weekly for shoulder and hand strengthening. Residual deficits include visual restrictions, short-term memory loss, and frequent headaches. He resides with his wife who currently is the only caregiver. She assists him with all activities. Depression and weight control are problems which cause great concern to his family (six grown children). Cognitive Level is 7 to 8.

Institutionalization may be necessary in the future considering that his 61-year-old wife is completely occupied with his care, and burnout or other physical deterioration is a distinct possibility.

To date, the medical payments are $90,873. However, residential care would escalate that figure rapidly if family support is diminished.

Case 5

In 1985, a 23-year-old male carpenter was injured in a fall, sustaining a closed head injury and subsequent subarachnoid hemorrhage. He was comatose for 21 days. After initial hospitalization, he entered a traumatic brain injury program for seven months, followed by a second rehabilitation facility confinement of six months duration.

He is now at Ranchos Los Amigos Cognitive Level 5, helpless and dependent, and has had a ventricular peritoneal shunt inserted. He resides in a foster home with two adults at a cost of $3,800 per month. Foster home providers have asked for increased funding, because the claimant is virtually a total care problem.

A sheltered workshop structured program was attempted at one time, but abandoned because of the multiple residual problems. The claimant's impairments include a speech deficit, limited vision, urinary incontinence, arm and leg weakness, and poor cognitive skills. He has had petit mal seizures in the last three years.

Total medical costs to date are approximately $500,000. Based on a projected life expectancy of approximately 37 years, medical reserves have been established at $2 million since completion of the survey.

Case 6

This 35-year-old tree surgeon, during his first day on the job in August 1986, fell approximately 50 feet from a tree after accidentally severing his safety belt with a saw. He sustained severe closed head injury with brain contusion and hemorrhage. He has remained in a persistent vegetative state since his injury. Coma stimulation protocols were attempted.

He has been in a rehabilitation center for 3½ years with costs
decreasing from $543 per day to $316 per day at the time of the study. He has had pneumonia, necessitating several hospitalizations, repeated eye infections, and recent increased grand mal seizure activity.

Total medical payments paid at the time of the study, including initial intensive care, were $399,289. Lifetime institutionalization appears inevitable. A shorter than normal life expectancy may be anticipated, because of recurrent complicating medical factors. The family has initiated a “do not resuscitate order” to his caregivers in the event of a cardiac arrest.

Case 7

A 48-year-old female sales manager sustained a closed head injury in a motor vehicle accident in November of 1986. There was frontal lobe contusion with a small subdural hematoma. A right shoulder injury caused by the accident was not diagnosed until approximately 1½ years post injury. Surgical repair of an acromioclavicular dislocation was then necessary.

There was both inpatient and outpatient rehabilitation in three different facilities. Pre-injury family conflicts were a serious factor in the reintegration of the claimant into the family unit. Unrealistic goals and expectations by family members added to the claimant’s difficulties, such as injury-related behavioral and cognitive deficits.

An alleged suicide attempt (unconfirmed serum drug level) resulted in heightened awareness of family problems. Day time attendant care became necessary to assure personal safety. Occult seizure activity required medication. Psychotropic drugs and psychotherapy were employed to relieve tension. These were reduced in the course of time and were noted to be continuing.

The claimant lived at home while involved in a head injury program (second phase). She displayed excessive frustration and intolerance of injury deficit behavior.

Total medical costs at the time of the survey were $283,000, with medical reserves of $458,000. An increase in reserves was anticipated.

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REFERENCES

EXHIBIT A
TBI–TAG 050 SURVEY


1. Diagnosis (be as specific as possible, e.g., subdural hematoma, subarachnoid hemorrhage, etc.).

2. Duration of unconsciousness (coma) after injury.

3. Document the claimant's current level of cognitive function.
   (Eight Levels of Cognitive Function) Circle One 1 2 3 4 5 6 7 8

4. Is the claimant: ☐ helpless and dependent ☐ functional and independent

5. Where does the claimant currently reside? ☐ home ☐ nursing home ☐ rehab center ☐ other (describe)

6. If at home: Does the claimant require nursing or attendant care? ☐ Yes ☐ No

7. If yes, what is the level of care required? ☐ R.N. ☐ L.P.N. ☐ ATTENDANT ☐ FAMILY
   ____ Hours per day ____ Days per week ____ Hourly rate

8. If a family member: What is the age and health of the primary care giver?

9. Estimated Monthly/Annual Costs:

<table>
<thead>
<tr>
<th>Monthly</th>
<th>Annual</th>
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<tbody>
<tr>
<td>Supplies</td>
<td></td>
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<tr>
<td>Occupational Therapy</td>
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<tr>
<td>Physical Therapy</td>
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<tr>
<td>Cognitive Retraining</td>
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<td>Counseling</td>
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<tr>
<td>Transportation</td>
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<td>Wheelchair Maintenance</td>
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<td>Physician Visits</td>
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<td>Respite Care</td>
<td></td>
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<tr>
<td>Other</td>
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</tbody>
</table>

10. Is a pharmacy management service for cost containment currently used?

11. Has the claimant had a seizure in the last year? Currently being treated for seizures?
☐ last attack over 5 years ago ☐ last attack 4-5 years ago ☐ last attack within 3 years
   Describe: ☐ Grand Mal ☐ Petit Mal

   Treatment Plan

12. Are there any known complications at this time?
   Describe

13. What was the date of the claimant's last evaluation?
   Date of Exam
   Physician's specialty/Psychologist
   Attach copy of report
14. Where did the claimant go for initial rehabilitation?
   - Head Injury Program
   - In-Patient/Out-Patient
   - Name of Facility/Hospital
   - Length of Program
   - Cost of Program

15. Did the claimant participate in any other rehab programs?
   - If so, identify program/facility
   - Duration of program

16. Is additional rehabilitation planned or needed? □ Yes □ No
   - Type
     - Behavior Modification
     - Cognitive Retraining
     - Speech
     - Occupational Therapy
     - Transitional Living
     - Physical Therapy
     - Independent Living
     - Other (Describe)

17. Is claimant currently employed?
   - Is Return to Work a realistic goal in the foreseeable future?

18. If the claimant is working, describe type of work and amount earned, e.g.,
   - RTW same employer, same job
   - RTW sheltered workshop, 4 hours per day at minimum wage

19. Any problems on job? Is employer satisfied?

20. Is a job coach needed? If so, for how long and at what cost?

21. Describe claimant’s limitations/restrictions.

22. Is the claimant involved in a liability suit as a result of this accident and injury or has claimant received
   a settlement as a result of a suit?

23. Is the claimant receiving Social Security Disability Benefits?

24. Are there any sources for benefits that may reduce Aetna’s liability for medical expenses or wage
   replacement, e.g., 2nd Injury Funds, Catastrophic Injury Funds, State Vocational Rehab Services?

25. Comments

Completed questionnaires should be returned to: Jim Urso, Project Coordinator
Medical Claim
TN1P

EXHIBIT B
POST TBI SURVEY QUESTIONNAIRE FOLLOW-UP

1. Reserves:

2. Attendant Care:

3. Nurse Consultant Involvement:

4. Present Medical:

5. Comments: